



PRE-RELEASE — DO NOT DISTRIBUTE

Summary of Fish and Water Chemistry Data, Kootenai River (MT and ID), 2018 and 2019

Jason Gildea (USEPA), Chris Mebane (USGS), and Christian Schmidt (USGS)

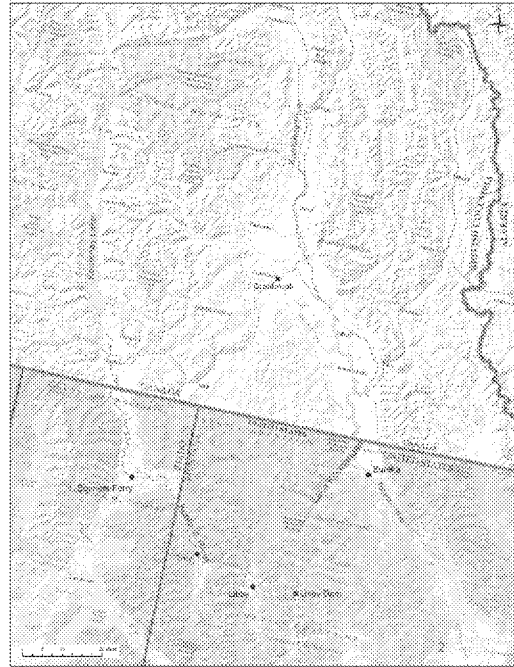


Kootenai/Kootenay River

- Originates in SE British Columbia (B.C.)
- Flows south into Montana, west into Idaho, and then north back into B.C.

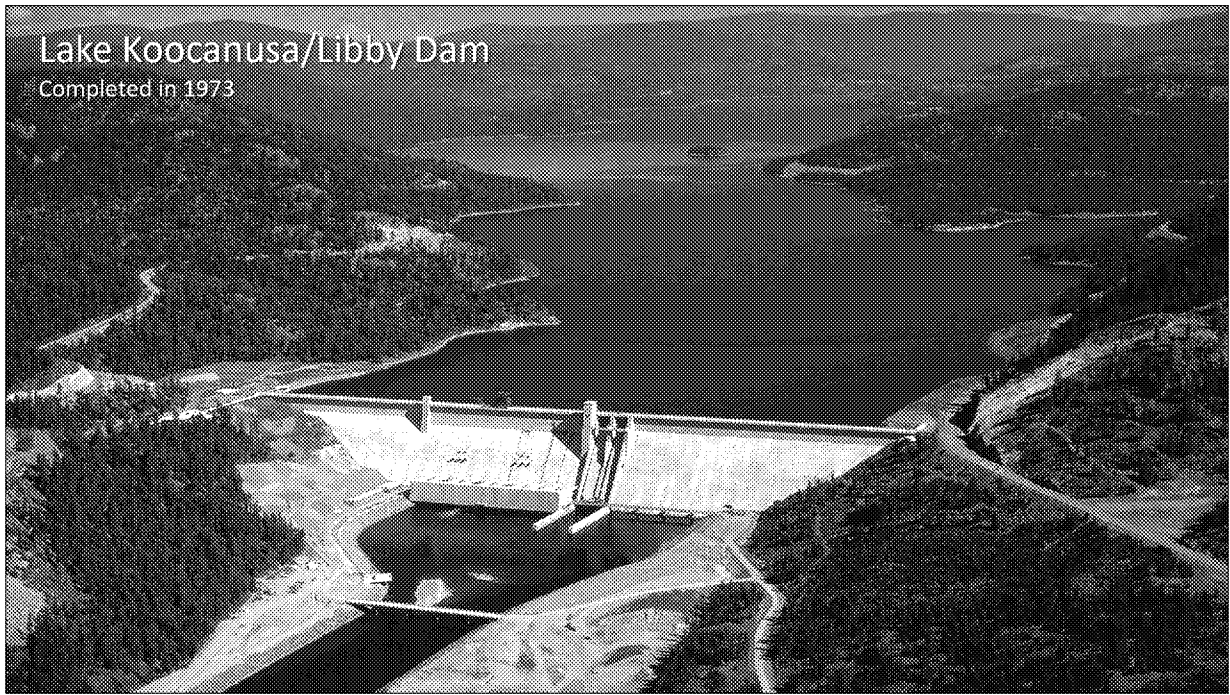
Lake Koocanusa

- Reservoir created by Libby Dam
- Located in Montana and B.C.



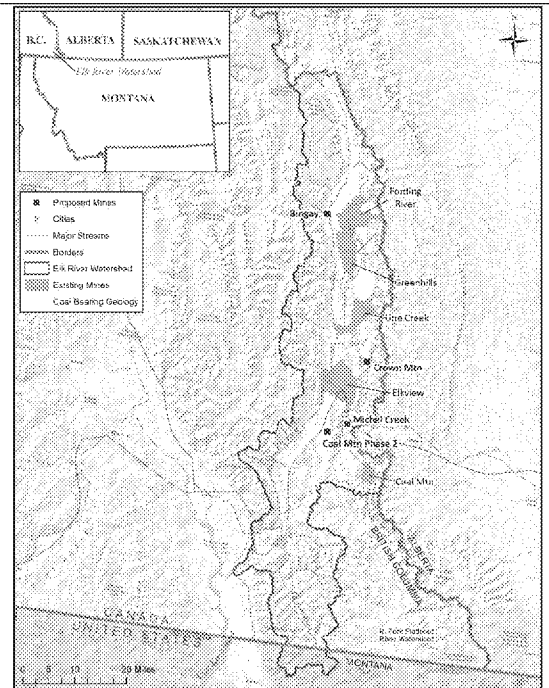
Lake Koocanusa/Libby Dam

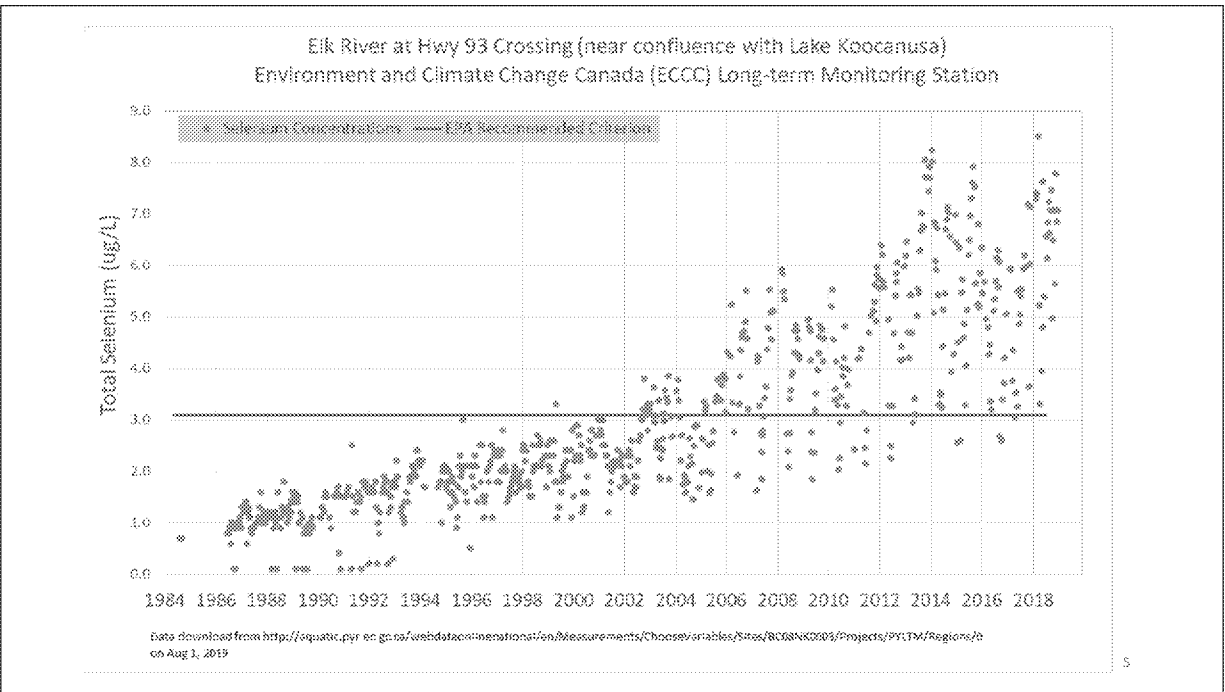
Completed in 1973

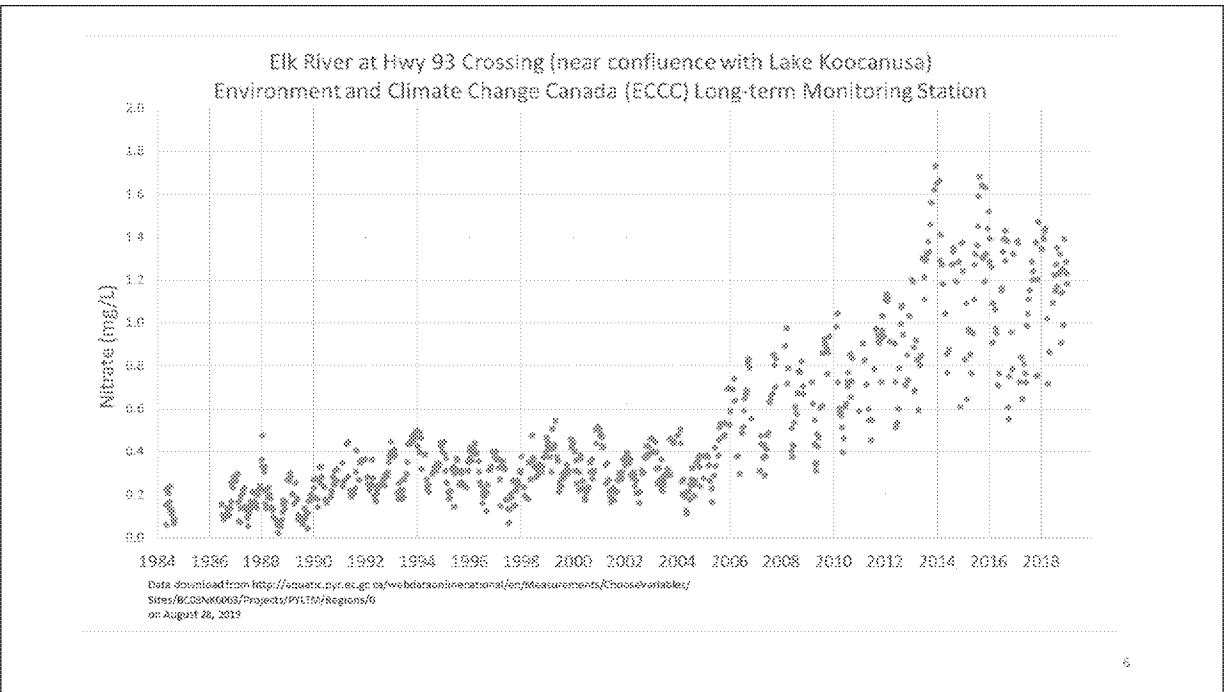


Water Quality Concerns

- High levels of selenium (Se), sulfate, cadmium, nitrate, and calcium originate from mine spoils in the Elk River valley in British Columbia
- Water column concentrations in the Elk River have increased over time
- The Elk River flows into the Kootenai/Kootenay River/Lake Koocanusa

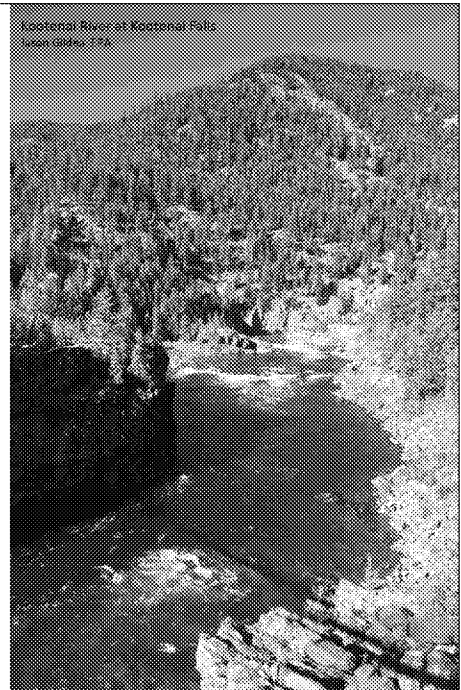






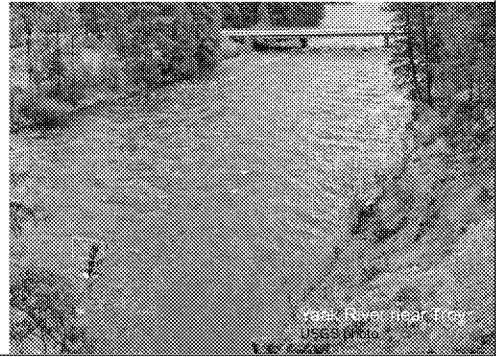
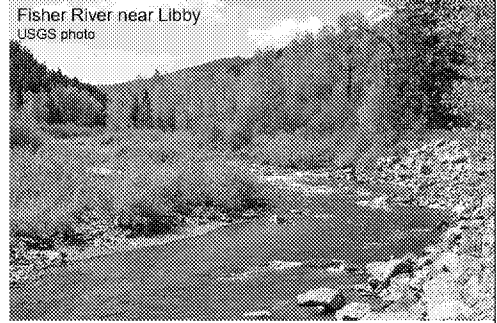
Kootenai River Study - Purpose

1. Build on prior studies showing elevated selenium (Se) and nitrate in Lake Koocanusa by evaluating downstream water quality and fish tissue in the Kootenai River between Libby Dam (MT) and the Idaho-Canada border
2. Assess Se and nitrate concentrations and loads in the Kootenai River and selected tributaries
3. Assess mercury (Hg) concentrations in fish tissue in the Kootenai River

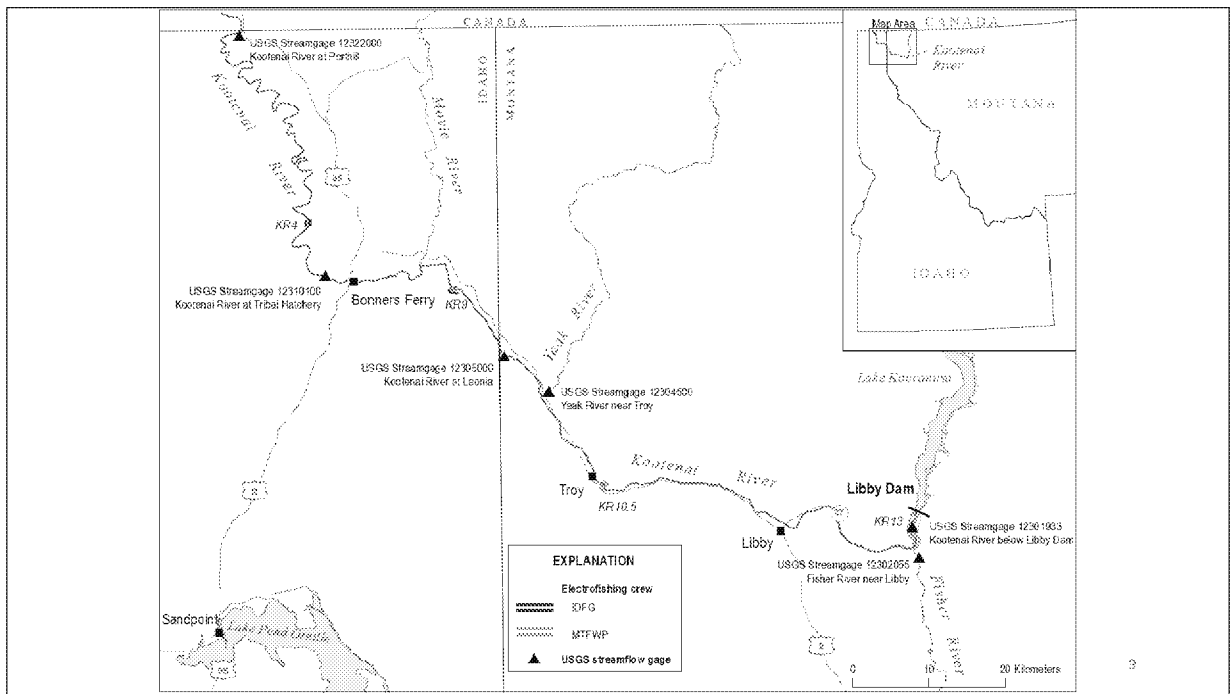


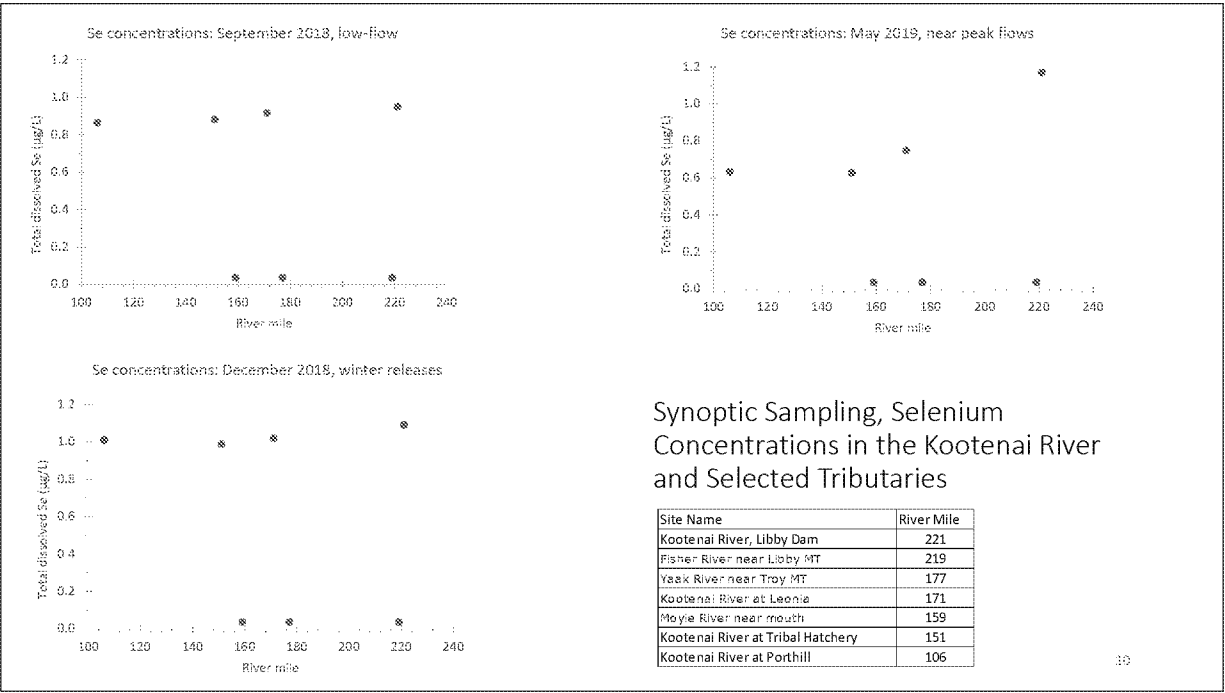
Water Chemistry Study Design

- Study funded by EPA and conducted by USGS to measure synoptic selenium and nutrient loads in the Kootenai River and three major tributaries
- **Kootenai River Sampling Locations:**
 - Kootenai River below Libby Dam (12301933)
 - Kootenai River at Leonia (12305000)
 - Kootenai River at Tribal Hatchery (12310100)
 - Kootenai River at Porthill (12322000)
- **Tributary Sampling Locations:**
 - Fisher River near Libby MT (12302055)
 - Yaak River near Troy MT (12304500)
 - Ungaged tributary: near mouth of Moyie River
- Synoptic sampling conducted three times
 - September 2018
 - December 2018
 - May 2019

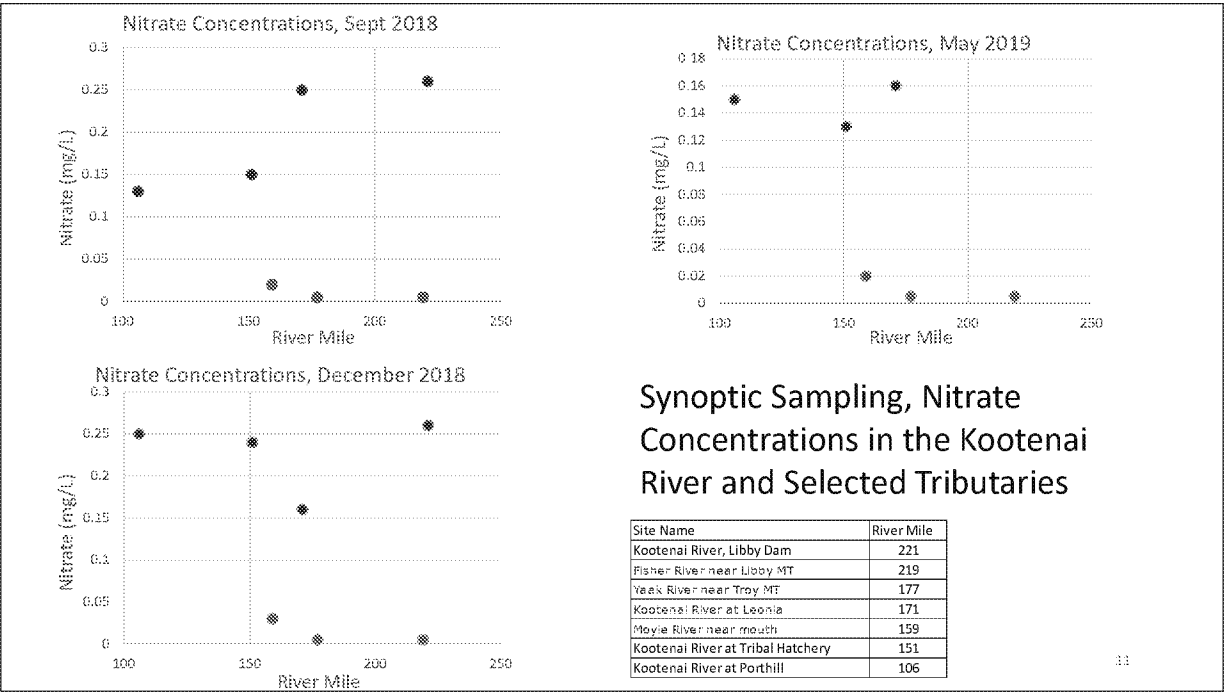


Synoptic sampling done at low and high flow conditions



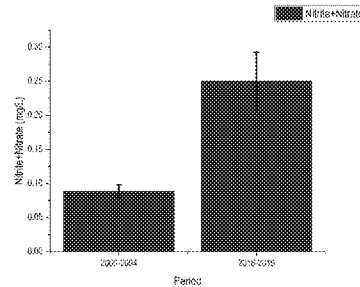


Highlight the VERY low detection limits – 0.037 ug/L.



Chemistry Results - Summary

- Most of the selenium in the Kootenai River originates from Lake Koocanusa and it is relatively persistent throughout the river
- The three sampled tributaries contribute no detectable selenium and minimal nitrate (mostly non-detectable concentrations)
- Nitrate concentrations have significantly increased since 2000-2004

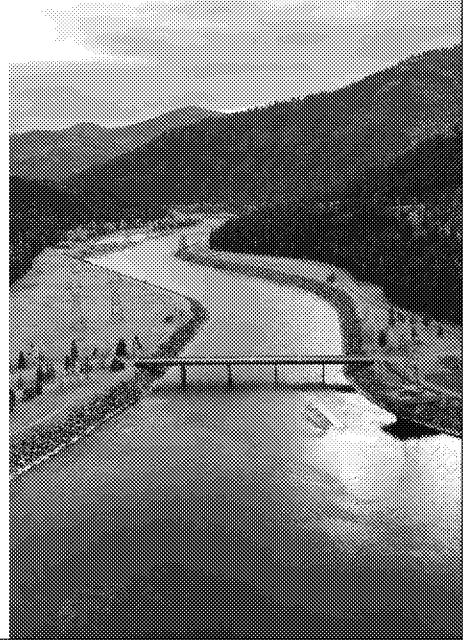


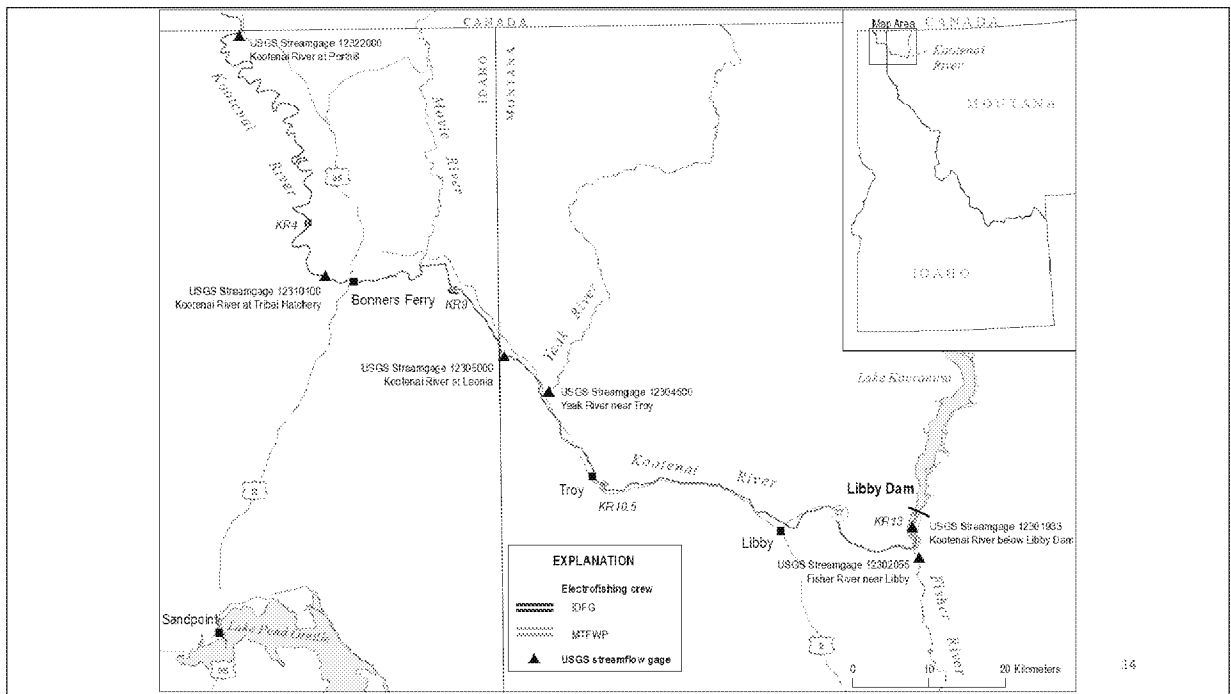
Selenium detection limit is 0.037 ug/L

Fish Tissue Study Design

- Study funded by EPA and conducted by USGS in partnership with KTOI, MFWP, and IDFG and EPA Region 10 Laboratory
- Fish tissue sampling was completed in conjunction with fall 2018 MFWP and IDFG fish population survey sampling at 4 sites on the Kootenai River:
 - Below Libby Dam (State agencies ID = KR13)
 - Downstream of Troy, MT (KR10.5)
 - Downstream of ID/MT border (KR9)
 - Shorty's Island (KR4) (Near Bonners Ferry, ID)

Kootenai River at Libby Dam
Jason Gildea, EPA

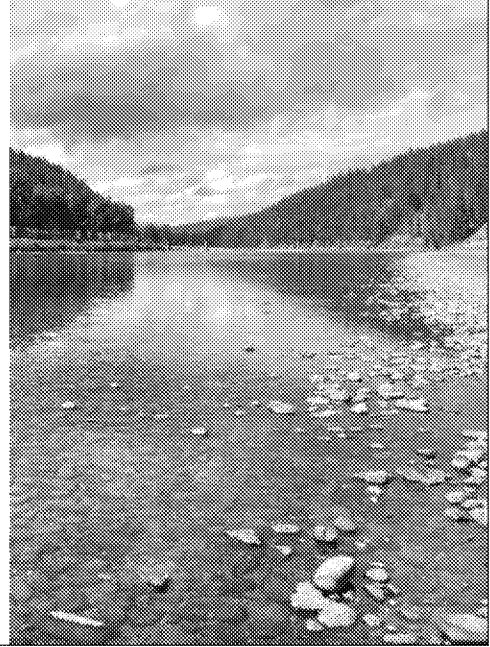




Fish Tissue Results

- 142 fish were analyzed for selenium and mercury and compared to EPA's recommended fish tissue criteria and human consumption recommendations
- Muscle fillets or whole body samples were analyzed for each fish
- Obtained fish species include: bull trout, kokanee, largescale sucker, longnose dace, longnose sucker, mountain whitefish, northern pikeminnow, peamouth chub, rainbow trout, redbside shiner, slimy sculpin, westslope cutthroat trout, yellow perch
- Eggs were obtained from 10 fall spawning fish (2 kokanee, and 8 mountain whitefish)

Kootenai River at Leonia (at MT/ID state line)
Chris McBane, USGS



EPA's 2016 Recommended Selenium Criterion to Protect Aquatic Life

Criterion Version	Chronic					Short-term
	Egg-Ovary ¹ [mg/kg dw]	Whole Body ¹ [mg/kg dw]	Muscle ¹ [mg/kg dw]	Water Lentic ¹ [µg/L]	Water Lotic ¹ [µg/L]	Water ¹ [µg/L]
2016 Selenium Criterion	15.1	8.5	11.3	1.5 (30 day)	3.1 (30 day)	Intermittent exposure equation
1999 Selenium Criteria	N/A	N/A	N/A	5 (4 day)	5 (4 day)	Acute Equation based on water column concentration

¹ A note on hierarchy of table: when fish egg/ovary concentrations are measured, the values supersede any whole-body, muscle, or water column elements except in certain situations. Whole body or muscle measurements supersede any water column element when both fish tissue and water concentrations are measured, except in certain situations. Water column values are derived from the egg & ovary concentrations via bioaccumulation modeling. Water column values are the applicable criterion element in the absence of fish tissue measurements, such as waters where fish have been extirpated or where physical habitat and/or flow regime cannot sustain fish populations, or in waters with new discharges of selenium where steady state has not been achieved between water and fish tissue at the site.

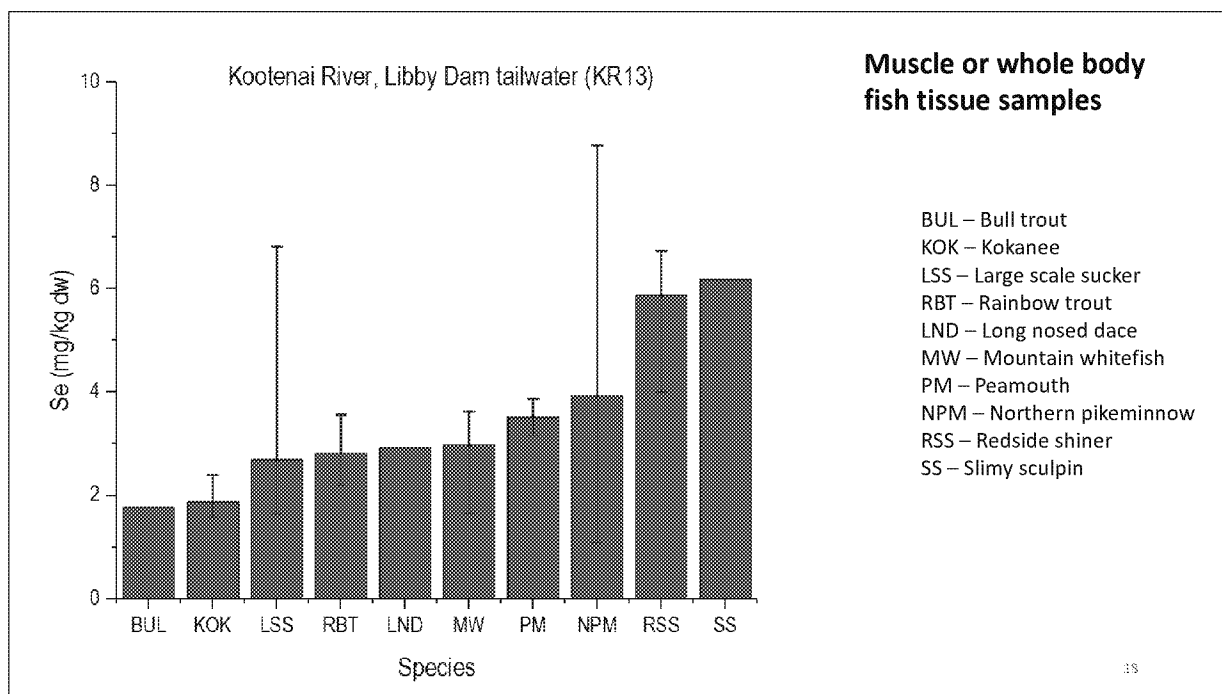
Selenium Fish Tissue Results

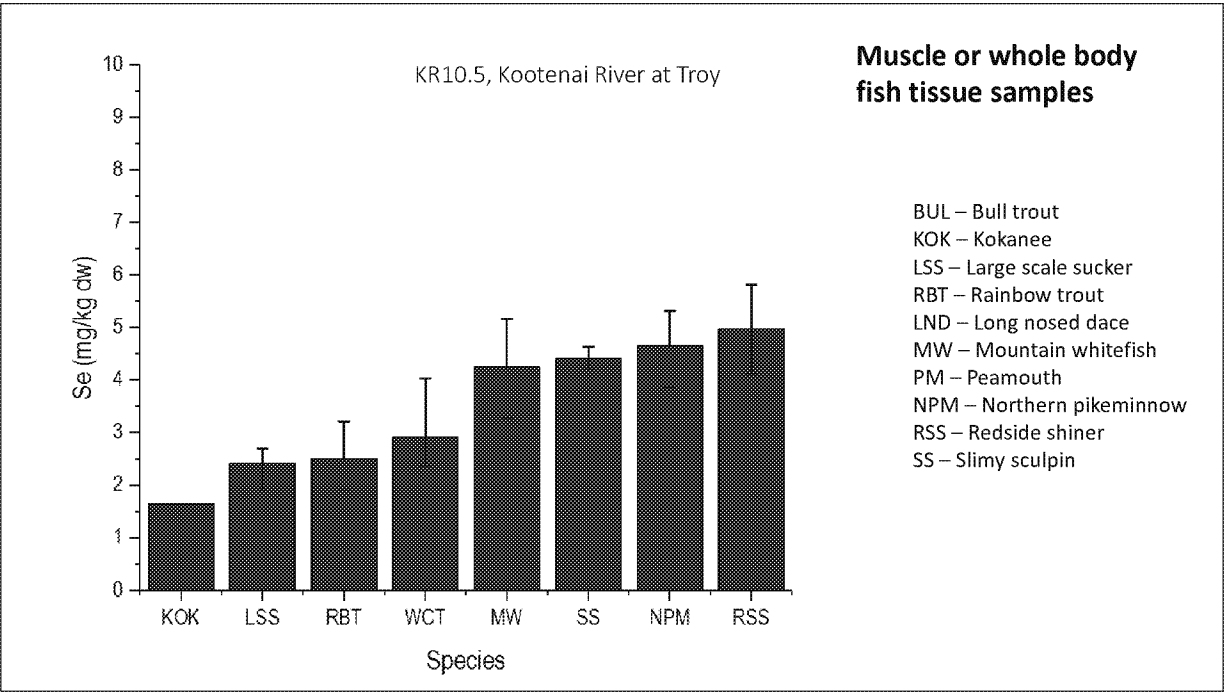
- 1 out of 142 fish samples exceeded EPA's recommended whole body or muscle selenium criterion
 - The one sample was for a redbreasted sunfish, which exceeded the whole body criterion of 8.5 mg/kg
 - All other samples were lower than EPA's recommended criterion
- 6 out of 8 mountain whitefish eggs exceeded EPA's recommended selenium criterion of 15.1 mg/kg
 - The six samples were obtained from three sites (Libby Dam, Troy, ID-MT Border)
 - Highest value was 24.8 mg/kg, collected at the MT-ID border
- States and tribes may want to review and use data for fish consumption advisories



17

EPA is not commenting on fish tissue advisories at this time, but agencies should use the data per their guidelines





Mercury Fish Tissue Results

- 3 out of 142 fish samples exceeded EPA's recommended methylmercury criterion of 0.3 mg/kg
 - Pikeminnow near Libby Dam
- States and tribes may want to review and use data for fish consumption advisories
 - Mercury concentrations ranged from 0.012 to 0.448 mg/kg, with an average of 0.071 mg/kg
 - EPA recommends considering fish consumption advisories for concentrations greater than 0.029 mg/kg

Table 4-3. Monthly Fish Consumption Limits for Noncarcinogenic Health Endpoint - Methylmercury

Risk Based Consumption Limit ^a	Noncancer Health Endpoints ^b
Fish Meals/Month	Fish Tissue Concentrations (ppm, wet weight)
Unrestricted (>16)	0 - 0.029
16	>0.029 - 0.069
12	>0.069 - 0.078
8	>0.078 - 0.12
4	>0.12 - 0.23
3	>0.23 - 0.31
2	>0.31 - 0.47
1	>0.47 - 0.94
0.5	>0.94 - 1.9
None (<0.5)	>1.9

USEPA. 2000. Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories - Volume 2: Risk Assessment and Fish Consumption Limits. Third Edition. EPA 823-B-00-008. Table 4-3

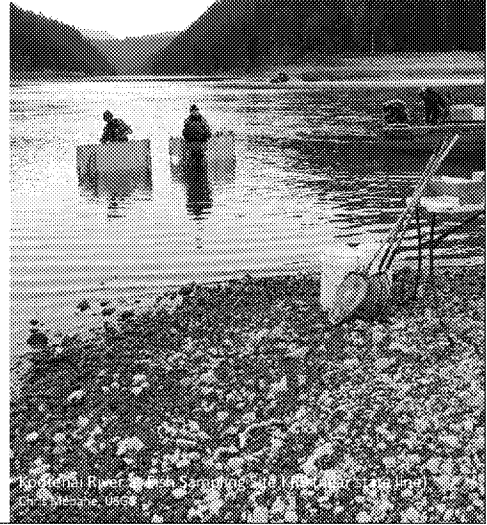
Note that mercury is not a pollutant from coal mining, but from atmospheric deposition

EPA is not commenting on fish tissue advisories at this time, but agencies should use the data per their guidelines

Fish Tissue Results Summary

- These are the first known fish samples in the Kootenai River (U.S.) that exceed EPA's recommended selenium criterion
- The results indicate that selenium originating from the Elk River valley is impacting mountain whitefish in the Kootenai River downstream of Libby Dam
- Mercury results may warrant fish consumption advisories
- Limited data were collected, and follow up studies should be conducted to further corroborate results

KR9, setting up



Kootenai River Fish Sampling Site (Kootenai State Line)
© 1998, U.S. EPA



Thanks to all of the project partners, including:

Chris Mebane, Christian Schmidt – USGS

Jennifer Crawford, Lil Herger – EPA R10

EPA Region 10 Manchester Lab

Genny Hoyle – KTOI

TJ Ross and the IDFG crew

Jim Dunnigan, Trevor Selch, and the FWP crew

Kevin Kirlin and the USGS Post Falls crew, with Michael Allen,

USGS data management

The analysts at Brooks Applied Laboratories and the USGS

National Water Quality Laboratory

Project funding from:

EPA HQ/Office of Water

Kootenai River at Leona
USGS photo

This study highlights the need for further monitoring ...

- Selenium and mercury monitoring in water and fish tissue in the Kootenai River between Libby Dam and the U.S.-Canadian border
- Selenium monitoring in eggs from various fish species, including spring spawning fish
 - Target mountain whitefish in collection efforts
- Collect and analyze tissue from various fish species in the Kootenai River to assess trends over time



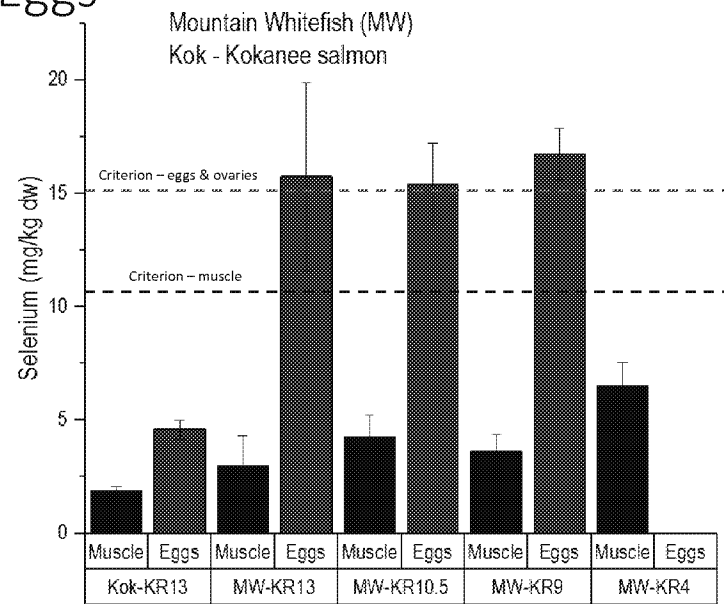
Kootenai River at Tribal Hatchery

EPA has requested some additional funding to sample during spring spawning.

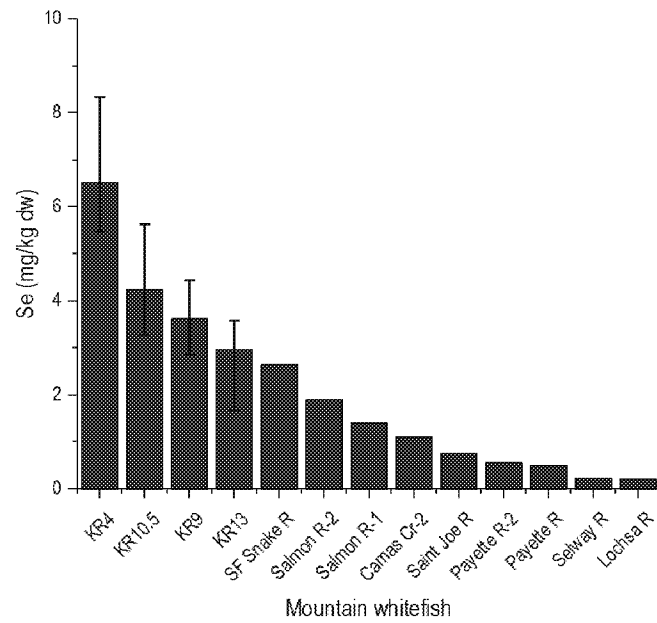
EXTRA SLIDES

(to be used as needed to address questions)

Eggs



Muscle selenium concentrations in selected Idaho rivers



Some comparisons between Kootenai River (KR) samples and other river locations in Idaho

Comparison data are from: **Essig, D.A. 2010. Arsenic, mercury, and selenium in fish tissue and water from Idaho's major rivers: a statewide assessment. Idaho Department of Environmental Quality, Boise, ID.**
<http://www.idaq.idaho.gov/water-quality/surface-water/mercury.aspx> (composite samples, ranging from 1 to 10 fish per sample)

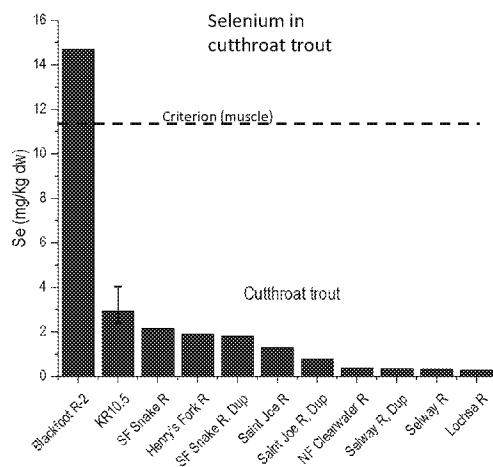
Idaho, statewide (in 2008)

Se in water,

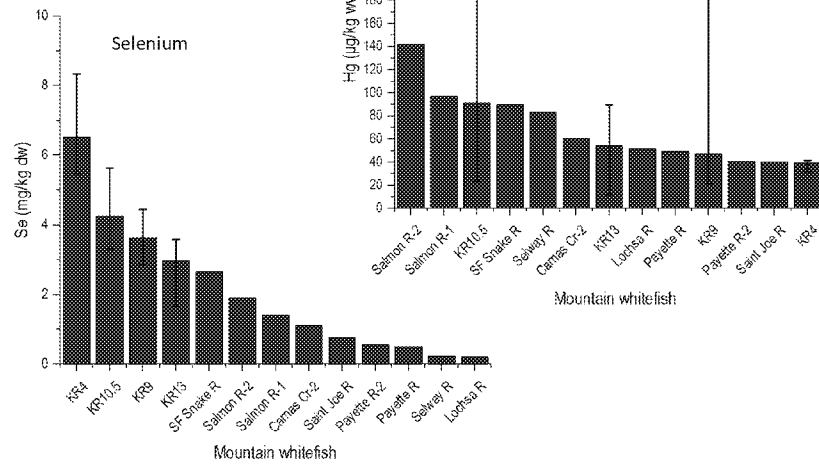
0.14 µg/L median, Range in water, <0.09 µg/L to 1.75 µg/L

Se in fish (all species, dry weight),

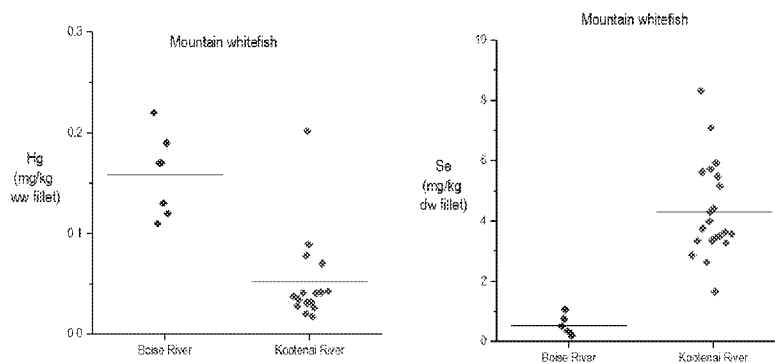
median 1.28, min 0.22, max 14.7 mg/kg mg/kg dw



Selenium and Mercury in Mountain Whitefish



Mercury and Selenium in Mountain Whitefish from the Kootenai and Boise Rivers



Often monitoring studies find an inverse pattern between Se and Hg in fish tissues. If Se is high, Hg will be low and vice versa,

Selenium and Mercury in
Northern Pikeminnow

